

WHAT IS CLAIMED IS:

1. (Currently Amended) A projection exposure apparatus, comprising:

an exposure light source;

an illumination system for illuminating a pattern, formed on a first object, with light from said exposure light source;

a projection optical system for projecting the pattern, as illuminated with the light, onto a second object; and

an interferometer for use in measurement of an optical characteristic of said projection optical system, wherein said interferometer is operable to perform the measurement by use of light from said exposure light source.

2. (Original) An apparatus according to Claim 1, wherein said interferometer is operable to measure at least one of wavefront aberration, field curvature and distortion of said projection optical system.

3. (Currently Amended) An apparatus according to Claim 1, wherein said interferometer is disposed on one side of said projection optical system, facing the first object.

4. (Currently Amended) An apparatus according to Claim 1, wherein said interferometer is disposed on one side of said projection optical system, facing the second object.

5. (Currently Amended) An apparatus according to Claim 1, wherein said illumination system includes incoherency transforming means for incoherency transforming the exposure light from said exposure light source and for directing the same to the first object, and wherein a light path switching means is disposed between said exposure light source and said incoherency transforming means, by which the light from said exposure light source can be selectively directed to one of said interferometer and said incoherency transforming means.

6. (Currently Amended) An apparatus according to Claim 1, wherein said interferometer includes a collimator lens mountably and demountably inserted on a path of the exposure light, for transforming, into parallel light, light converged on and diverged from one of the surface of the first object and the surface of the second object.

7. (Original) An apparatus according to Claim 1, wherein said interferometer has a function for making optical path lengths for reference light and detection light registered with each other.

8. (Currently Amended) An apparatus according to Claim 1, further comprising an alignment scope having an objective lens, for alignment between the first and second objects, wherein said interferometer includes a collimator lens for transforming, into parallel light, light converged on and diverged from one of the surface of the first object and the surface of

the second object, and wherein said objective lens of said alignment scope functions also as said collimator lens.

9. (Original) An apparatus according to Claim 1, further comprising reflection means disposed on one side of said projection optical system facing to one side of said projection optical system facing to one of the first and second objects, wherein the light passing through said projection optical system is reflected by said reflection means backwardly along its oncoming path, so that it is directed to said interferometer.

10. (Original) An apparatus according to Claim 9, wherein said reflection means comprises one of a spherical surface mirror, a plane mirror and a wafer.

11. (Original) An apparatus according to Claim 9, wherein said reflection means is provided on a movable stage for carrying thereon the second object.

12. (Original) An apparatus according to Claim 9, wherein a field curvature of said projection optical system is detected on the basis of a revolutionally symmetrical component involved in a wavefront as measured by said interferometer and of coordinate positions, with respect to an optical axis direction, of said reflection means and said collimator lens of said interferometer upon measurement of the wavefront.

13. (Original) An apparatus according to Claim 12, wherein the revolutionally symmetrical component is a power component.
14. (Original) An apparatus according to Claim 9, wherein distortion of said projection optical system is detected on the basis of a revolutionally asymmetrical component involved in a wavefront as measured by said interferometer and of coordinate positions, with respect to an optical axis direction, of said reflection means and said collimator lens of said interferometer upon measurement of the wavefront.
15. (Original) An apparatus according to Claim 12, wherein the revolutionally asymmetrical component is a tilt component.
16. (New) An exposure method comprising:
- illuminating a pattern formed on a first object, by use of light from an exposure light source;
- projecting the pattern onto a second object by use of a projection optical system; and
- measuring an optical characteristic of the projection optical system by use of an interferometer and on the basis of light from the exposure light source.

17. (New) A device manufacturing method comprising the steps of:
- preparing a mask;

illuminating a pattern formed on the mask, by use of light from an exposure light source;

projecting the pattern onto a substrate by use of a projection optical system;

and

measuring an optical characteristic of the projection optical system by use of an interferometer and on the basis of light from the exposure light source.

18. (New) An exposure method comprising:

illuminating a pattern formed on a first object, by use of light from an exposure light source;

projecting the pattern onto a second object by use of a projection optical system; and

measuring an optical characteristic of the projection optical system by use of an interferometer.

19. (New) A method according to Claim 18, further comprising performing at least one of spacing adjustment and eccentricity adjustment for an optical element of the projection optical system, in accordance with the measurement in said measuring step.